

Mussel Movements



For use with: Arizona Wildlife Views Television Show, 07-08 Season, Episode 12

Invasive Species; Populations; Technology

Time Frame: 3-4 hours

Grade: 4-8

Overview:

This video starts with a brief look at the Arizona Game and Fish Department's efforts to improve hunting access for disabled individuals. Biologists' efforts to restore native fish to one neglected stream and an endangered frog to another are highlighted. In addition, a new threat to the state's aquatic resources – the highly invasive quagga mussel – is discussed. Students have the opportunity to analyze the migration of the mussel through Arizona, predict future movement, and develop an action plan to control the pest.

Essential Questions

- How do biologists manage wildlife populations?
- How can human activities benefit and harm wildlife?
- How do changes to an ecosystem affect the survival of an organism?

Objectives

- Explain the impact that technology has made on fish biology and recovery.
- Use a map of quagga mussel sightings to predict future movement patterns for up to one year.
- Write an action plan to slow or prevent the future spread of the quagga mussel.

Arizona Department of Education Standards

Science

4 th grade	5 th grade	6 th grade	7 th grade	8 th grade
S3-C1-PO1	S3-C1-PO2	S2-C1-PO4	S2-C1-PO4	S3-C2-PO1
S4-C3-PO4	S3-C1-PO3	S3-C2-PO1	S3-C1-PO3	S4-C4-PO1
	S3-C2-PO1	S3-C2-PO4	S3-C2-PO1	

Social Studies

4 th grade	5 th grade	6 th grade	7 th grade	8 th grade
S4-C6-PO3	S4-C1-PO4	S4-C1-PO4	S4-C5-PO5	S4-C6-PO3
	S4-C6-PO2	S4-C6-PO2	S4-C6-PO3	
	S4-C6-PO3			

Workplace Skills

4 th – 8 th grades
3WP-E2

Materials and Resources

- Copy of Arizona Wildlife Views episode



Teacher Preparation

- Acquire a copy of the television show. You can check local listings to determine when it will air and record it directly. You may also check the Department's web site to see if a copy can be downloaded or ordered.
- Write the vocabulary words and questions on the board.

Background Information:

This is not a lesson plan in the traditional sense. It does not provide step-by-step directions for

completing an activity. Instead, it provides information to help you use an episode of the *Arizona Wildlife Views* television program in

your classroom. It contains four suggested activities along with extensions and modifications. The first activity focuses on vocabulary. We have provided and defined some of the words used in the video. You are encouraged to use any appropriate strategies to introduce these to your students. Then, there is a series of comprehension questions that students can answer while watching the video. Answers (directly from the video) are provided in italics. Next, the critical thinking questions build on the major concepts introduced in the video. Students need to put a little bit more thought into these questions. Some reasonable answers are provided in italics. However, teachers should be cautious and realize that students may provide additional answers that can be supported with evidence. Finally, there is an in-depth activity. This activity allows students to evaluate and synthesize one or more of the concepts from the video, perhaps applying it to a new context or utilizing additional skills.

This episode originally aired on PBS (KAET, Channel 8) in Phoenix on April 27, 2008. It may also be shown on regional PBS stations or other channels. For additional viewing information or download options, please visit <http://www.azgfd.gov/focuswild>.

Additional information about the animals featured in this episode can be found at:

- ✓ Arizona Fish Hatcheries:
http://www.azgfd.gov/h_f/hatcheries.shtml
- ✓ Protect Your Waters:
<http://protectyourwaters.com/>
- ✓ 100th Meridian Initiative:
<http://www.100thmeridian.org/>
- ✓ Quagga Mussel Information:
http://www.azgfd.gov/h_f/zebra_mussels.shtml
- ✓ Invasive Mussel FAQs:
<http://www.azgfd.gov/pdfs/QuaggaMusselFAQs.pdf>

Relevant Vocabulary:

- Acclimate – to adapt or adjust to new environmental conditions

- Extirpation – extinction of a population in one particular area
- Filter feeder – an organism that strains small particles from water
- Mollusk – soft-bodied animal without a backbone that often has a shell, such as clams and snails
- Prolific – reproducing at a fast rate
- Quarantine – to isolate from other animals to check and treat for diseases
- Repatriate – to restore an animal to its native range

Comprehension Questions:

1. Where is Ash Creek located? *Answer: In the Tonto National Forest above the Salt River Canyon.*
2. How long were the fish quarantined before they were released in the new stream? *Answer: About two weeks.*
3. How many fish are native to Arizona? How many of these are extinct? *Answer: There are 35 fish native to the state. Only one has gone extinct.*
4. When was the quagga mussel first discovered in Arizona? Where? *Answer: In January 2007 in Lake Mead.*
5. How big does a quagga mussel get? *Answer: About the size of a thumbnail.*
6. What is encrusting? Why is it a problem? *Answer: Encrusting is when a mussel sticks to a hard surface. It can damage boat motors or clog pipes and canals.*
7. How are the quagga mussels a threat to wildlife? *Answer: They consume much of the microscopic organisms that are the base of the food chains in lakes.*
8. How large can the tarahumara frog get? *Answer: About 4.5 inches.*
9. How much did the tarahumara frog reintroduction cost the Arizona taxpayer? *Answer: Nothing. Most of the money was provided by the Heritage Fund which comes from the Arizona State Lottery and much of the labor was provided by volunteers.*
10. What beetle is a significant threat to the survival of the tarahumara frog? *Answer:*

The toebiter, which is a predacious beetle with a paralyzing bite.

Critical Thinking Questions:

1. Why are the captured fish taken to a hatchery rather than being taken directly to the new stream for reintroduction? *Answer: The fish are quarantined at the hatchery to make sure they are free from diseases and parasites. If they were taken directly to the new stream, they could pass these diseases on to other organisms. In addition, it can sometimes be difficult to identify fish larva. By isolating the captured fish for a while, biologists can ensure that unwanted fish species are not transported to the new stream.*
2. Why is it important to have populations reintroduced to multiple locations? *Answer: If a reintroduced species exists in only one location, it is more likely that a catastrophic event like flooding or disease can wipe out the entire population. In addition, it helps maintain the genetic diversity of the entire species.*
3. How has technology improved fish management? *Answer: Portable electrodes that can now be carried on the backs of researchers have made it much easier to catch large amounts of fish relatively quickly with minimal harm to the animal. This allows the scientists to do their job quicker, better, and more efficiently.*
4. Why was the location of the frog release kept secret? *Answer: Frogs are very sensitive to environmental changes and stress. The frogs being released in the video are endangered in Arizona. By keeping the release site a secret, the scientists were ensuring that the frogs would be less likely to be disturbed by the general public that may be interested in seeing the frogs.*

In-Depth Activity: Tracking the Quagga

The quagga mussel was first found in Arizona in Lake Mead in January 2007. Since then, it has been found in Lake Havasu, Mohave Lake, and a portion of the CAP canal in Scottsdale. It is

suspected to be in Lake Powell, although it has yet to be discovered there. In December 2007, it appeared in Lake Pleasant.

Locate and mark these lakes and the canal on an Arizona map. Look closely at the sites. How do you think the quagga mussel traveled? Are the locations connected, perhaps by rivers or canals? Could the mussels have traveled through the water or would they have needed to hitch a ride, perhaps on the bottom of a boat?

How fast does the quagga mussel appear to be moving? Approximately how many miles did they travel in 2007? If left uncontrolled, where do you think the mussel might travel over the next year?

Pretend you are a wildlife manager responsible for the state's lakes and rivers. Develop an action plan to attempt to slow or prevent the further spread of the quagga mussel. Write a brief paper explaining your plan. Be sure to address the following questions: What would you do to control the animal? What public education programs, if any, would you initiate? Where would you focus your efforts? How would you use volunteers and staff? Would you consider trying to pass any laws? What challenges might you encounter? What resources would you need to successfully implement your action plan?



Differentiated Instruction:*Extensions:*

- **Art:** Education is a large part of preventing the further spread of the quagga mussel. Design a poster that could display in various marinas and lake visitor's centers. It should inform boaters of the dangers of the animal and the steps they need to take to help.
- **Mathematics:** There are 27 species of frogs and toads found in Arizona. Of these, 6 are protected, including the tarahumara frog, and 3 are non-native. Make a pie chart illustrating the percentage of frogs and toads that are protected and non-native.
- **Science:** Visit a local fish hatchery. Interview one of the employees. Ask about the hatchery and possible careers. What types of fish are raised there? How many fish? What is the average cost to run the hatchery for a year? What type of technology is used in the field? What jobs are required to run a hatchery? What special training and skills are required?

Modifications:

- Create a student handout with the vocabulary words and questions already provided.
- Provide students with the definitions and have them match them to the appropriate vocabulary words.
- Provide fill-in-the-blank responses for the Comprehension Questions, allowing students to listen for appropriate words to complete the sentences.

**Reflection:**

Use the space below to reflect on the success of the lesson. What worked? What didn't? These notes can be used to help the next time you teach the lesson. In addition, the Department would appreciate any feedback. Please visit <http://www.azgfd.gov/focuswild> and submit a lesson evaluation.